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Science and Technology for Tomorrow's Air and Space Force

Success Story

TURBINE ENGINE SMOKE MEASUREMENT SYSTEM COMPLETES VALIDATION

The Propulsion Directorate and the University of Dayton Research Institute (UDRI) collaborated to design, fabricate, and verify a new automated turbine engine smoke sampling system. This system supports the Versatile Affordable Advanced Turbine Engines (VAATE) program for the Department of Defense joint services, National Aeronautics and Space Administration, Department of Energy, and industry.

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Accomplishment

The directorate-developed system performs in-house evaluation of turbine engine gaseous emissions. This capability includes combustion tests to measure gaseous emissions from turbine engines in order to assess the pollutant characteristics and fuel efficiency of advanced engine design concepts. The new smoke sampling system has a number of unique features that are critical for obtaining accurate VAATE program assessments of turbine engine soot emissions. The system also increased productivity by providing a three fold decrease in the time required for test data collection.

Background

Traditionally, the directorate sampled turbine engine smoke, an aerosol containing soot, by utilizing a 1970's technology engine smoke emission analyzer. This testing was limited to only applying the same standard used to test aircraft engine emissions for commercial certification. However, during the past 3 years, scientists performed rich burning experiments involving VAATE research to reduce particle matter (soot) emissions. The tests seriously strained the conventional smoke data collection process. The directorate and UDRI overcame this challenge in their successful development and validation of the new system.

Propulsion
Support to the Warfighter

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (04-PR-19)